



# Policy initiatives and firms' access to external finance: Evidence from a panel of emerging Asian economies<sup>☆</sup>

Udichibarna Bose<sup>a,\*</sup>, Ronald MacDonald<sup>b</sup>, Serafeim Tsoukas<sup>b</sup>

<sup>a</sup>Subject of Finance, Essex Business School, University of Essex, C04 3SQ, UK

<sup>b</sup>Subject of Economics, Adam Smith Business School, University of Glasgow, G12 8QQ, UK

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## ABSTRACT

This paper analyses the impact of policy initiatives co-ordinated by Asian national governments on firms' composition of external finance. Using a unique firm-level database of eight Asian countries- Hong Kong SAR, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan and Thailand over the period of 1996–2012 and a difference-in-differences approach, the results show a significant response of the debt composition to the policy change. We find that firms increased their uptake of long-term debt, while decreased their short-term debt. We also document that less risky and more profitable firms are more significantly affected by the policy change than riskier and less profitable firms. Finally, we show that the improved access to external finance after the policy initiative helped firms to raise their investment spending.

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## 1. Introduction

The 1997–98 Asian financial crisis prompted policymakers in Asia and the Pacific to initiate a series of reforms aimed at the development and strengthening of the regional bond markets. The most prominent initiative of Asian Bond Funds (ABF and ABF-2) was undertaken in two waves in 2003 and 2005. The main role of this policy intervention was to broaden investor participation and improve market infrastructure in order to expand the domestic bond markets. As post-ABF data has become widely available and their Latin American counterparts seek to adopt similar programmes, it is important to examine the extent

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\* Corresponding author.

E-mail address: [ubose@essex.ac.uk](mailto:ubose@essex.ac.uk) (U. Bose).

to which this project has been successful in meeting the above objectives. The present paper provides new evidence on the response of corporate financial choices to the introduction of policy initiatives in Asia. More specifically, we ask whether these initiatives have led to better/improved access of firms to external finance compared to firms that operate in an economy that did not participate in this policy intervention. We also consider whether the initiative helped firms finance their investments by increasing their access to external finance. In doing so, we investigate whether particular segments of firms have higher incentives to take advantage of these initiatives due to the degree to which they are limited in raising further finances internally or from other external sources.

There is evidence that the extra-national initiatives encouraged expansion and liquidity in the Asian domestic bond markets by implementing several market reforms such as liberalising foreign exchange administration rules, exempting withholding tax of non-resident investors, improving the regulatory framework, strengthening domestic market infrastructure, decreasing cross-border settlement risk and creating transparent and credible bond indices (Packer and Remolona, 2012). These regulatory reforms helped in fostering the domestic bond markets and their issuer base. The size of local currency bond markets, as a percentage of GDP, experienced a sharp increase from 42.8% since the launch of the Asian Bond Markets Initiative (ABMI) in 2003 to 54.5% in Q3 2008 (Spiegel, 2012).<sup>1</sup> This trend is also noted in Ayala et al. (2015), who argue that the strong policy change since the ABF is a legitimate explanation for the development of local markets in Asia.

Comparing the issuance of long-term debt of participating firms in our sample with non-participating firms reveals a large gap between the two groups: USD 66.89 bn for the former versus 2.91 bn for the latter. Even when making a before-and-after comparison, we can see that the average long-term debt of participating firms increased from USD 49.06 bn before the ABF to 54.41 bn after the ABF. However, it is not clear how much of this change stems from the policy change itself and how much is due to improvements in the general economic climate. A difference-in-differences model will tease out the regional bond development and policy influences. In order to separate the effects of this regional development from the effects of regional policy initiatives, we refer to Taiwan as a control. Taiwan saw similar development in its national bond market and is comparable to the other Asian economies, but it did not participate in the ABF, ABF-2 or Asian Bond Markets Initiatives (ABMI).<sup>2</sup>

The identifying assumption for the research design is that economies that participated in the policy initiative and the one that did not would have trended similarly in the absence of the policy change. The parallel trends assumption is supported by the institutional background of the Asian initiatives as well as graphical evidence.<sup>3</sup> Fig. 1 graphs the evolution of bond market size in Asian economies over the sample period of 1996–2012. Panel A displays similar growth patterns of corporate bond market size for both control and treated groups until the end of the Asian financial crisis in 1999. However, since 2000 there has been an upward trend in bond market size for the treated group, and the gap between the two groups further widened after the introduction of ABF-2 at the end of 2004 (see the solid vertical line which indicates the introduction of the policy initiative). A comparison of the bond markets of several Asian economies in Panel B gives a preliminary glimpse at the changes that took place over the past decade. The reported figures refer to bond market size broken down into three time periods. It is clear that in 2012 all economies experienced a sharp increase in the size of their bond markets.<sup>4</sup> Fig. 2 graphs the development of the banking sector in the treated and control groups over the sample period. The graph displays the growing trend of the banking sector in the treated group after the Asian financial crisis, while the growth in the control group remains almost flat throughout the period. The graphs described above confirm the parallel trends assumption in our data which suggests that in the absence of the policy change the two groups would have continued to track each other.

Much of the empirical investigation of firms' external finance considers how exogenous shocks affect firms' financing choices. Bris et al. (2014) show that non-financial firms from euro countries with previously weak currencies considerably increased their debt financing after the introduction of the euro. Leary (2009) argues for and demonstrates the impact of a market for certificates of deposit which led to an increase in bank credit and firms' leverage. Sufi (2009) shows that third-party certification of quality is an important signal to uninformed investors, which improves access to financial markets. In particular, the degrees of information available to uninformed investors have a significant effect on the willingness of those investors to purchase debt. Further, Lemmon and Roberts (2010) document that the collapse of Drexel Burnham Lambert had a negative effect on firms' finance and investments, especially for those that were using high-yield debt financing. In the Asian context, recent work by Mizen and Tsoukas (2014) demonstrates that regional initiatives have been an important step towards greater bond issuance by firms in Asia, mostly by fostering market deepening and improving liquidity.

But it is not clear whether the demand for all types of external finance will increase proportionately. Some components of external finance may prove more attractive than others, driving up the demand for bank borrowing relative to the demand for credit obtained from debt or equity markets. On the other hand, it may be the case that firms opt to replace short-term debt for longer-term debt if short-term interest rates fall below the rates that are expected to prevail in the longer run. In addition, some types of firms may find that the credit constraints that they face on the supply side, from financial markets and financial

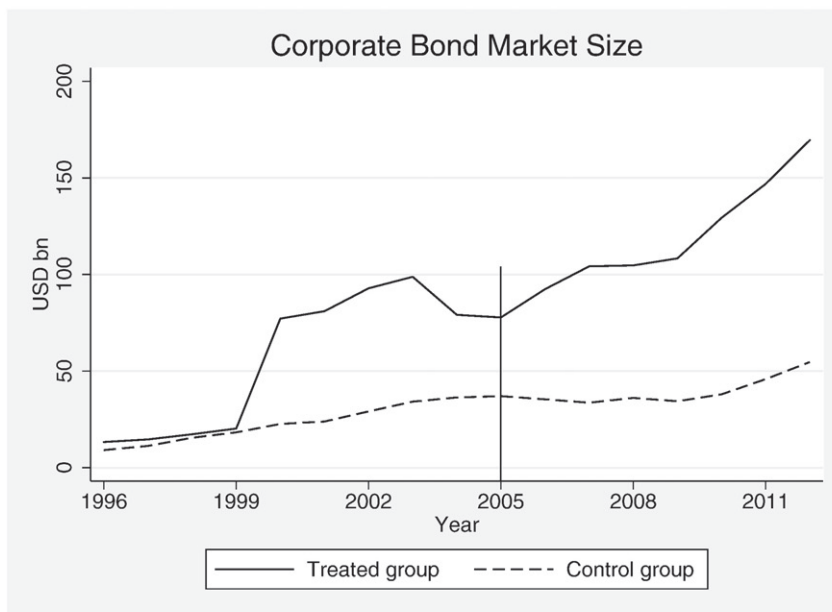
<sup>1</sup> Levinger et al. (2014) provide evidence that the corporate bond market capitalisation in Asia reached 24.2% of the region's GDP by 2012, from 16.7% in 2008. In terms of value, the amount of corporate bonds outstanding has almost tripled since 2008, amounting to USD 3.2 tn by Q3 2013.

<sup>2</sup> See Section 3.1 for details about the characteristics that are unique to the choice of Taiwan as a control.

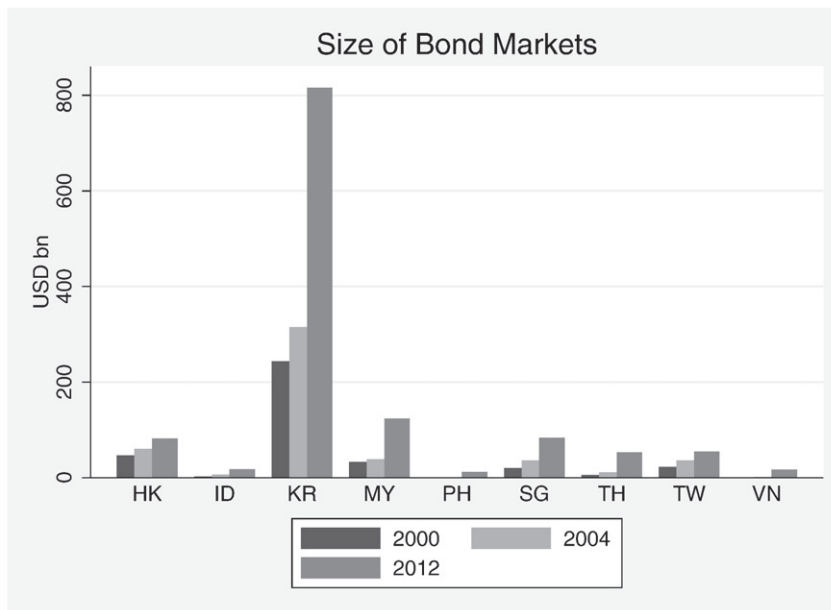
<sup>3</sup> In the robustness section of the paper we present a placebo test to show that there are no underlying trends in the pre-policy period which may have influenced the treatment effect.

<sup>4</sup> Amongst the countries in our treated group, Korea has the largest bond market. Hence, in order to confirm that our results are not driven by Korea, we exclude this country from the treated group. We find that our results, reported in the robustness section, are both qualitatively and quantitatively similar to our main results including Korea.

(a) LCY corporate bond market size (USD bn)



(b) Size of bond markets by country



**Fig. 1.** Size of bond markets for treated and control groups. Country abbreviations are as follows: HK=Hong Kong, ID=Indonesia, KR=Korea, MY=Malaysia, PH=Philippines, SG=Singapore, TH=Thailand, TW=Taiwan and VN=Vietnam.

intermediaries, are relaxed less quickly than for other types of firms. Firms that were previously only able to obtain credit from banks, perhaps because they lacked track record reputation and were too small to tap the financial markets, find that other forms of credit become more readily available.

In this paper we look at the financial health of the firms, reflected in the quality of their balance sheets. Then we consider firms' financial structure, generating different ratios of short-term or long-term debt that measure their choice of external finance. Finally, we observe a unique policy experiment, namely the ABF initiative, which will be used to identify the effects of the policy change on firms' composition of external finance. Our empirical work is based on an assessment of the policy initiative on firms' access to external finance using an unbalanced panel of 7436 Asian listed firms between 1996–2012. We merge data

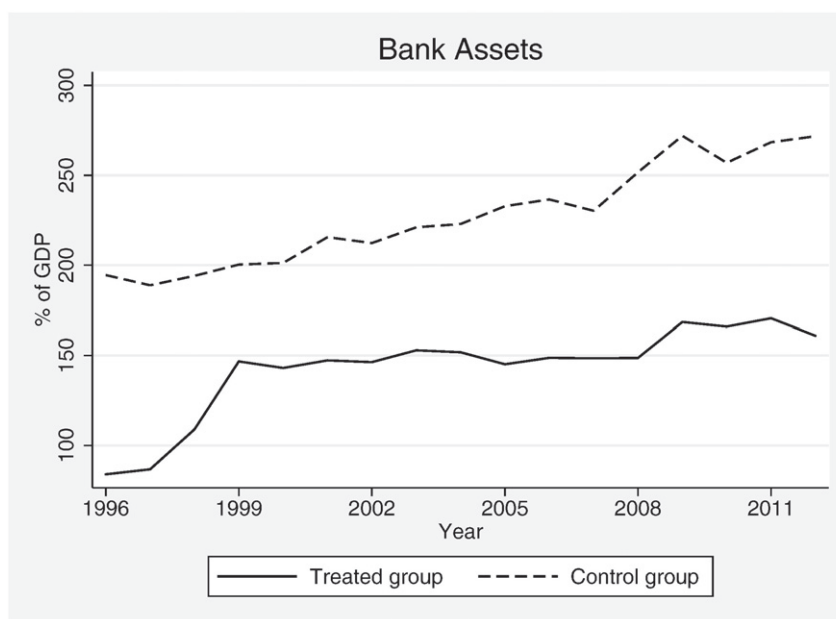


Fig. 2. Banking sector development in treated and control groups.

from different sources, including Bondware, Bloomberg, Standard and Poor's Compustat Global database, the Global Financial database and the IMD World Competitiveness Yearbook.

Our paper contributes to the existing literature in two important ways. First, we analyse the role of the policy initiatives in the changing financial composition of firms' balance sheets. We extend the analysis in [Mizen and Tsoukas \(2014\)](#), who show that the regional initiatives in Asia had a positive impact on firms' probability of issuing bonds, by considering the choice of firms' access to market- versus bank-based debt. This approach allows us not only to remove demand-side influences, but also to investigate relative changes of bank to non-bank funding. Moreover, we explore whether firms are heterogeneous and have differing degrees of financial status which may influence their ability to modify their capital structure. Financially constrained firms have to pay more to compensate investors for the higher risk of default, which is consistent with the observation that firms with lower creditworthiness face higher external finance premia. We explore how the interplay between changes in financial health and the introduction of policy initiatives affects the choice of external finance. This will help us understand the mechanism through which the policy initiative has affected different types of firms.

Second, we build on the foundations of the extant literature on firms' investment spending ([Almeida and Campello, 2007](#), [Duchin et al., 2010](#), [Fazzari et al., 1988](#)), which discusses how firms' financial status affects investment. However, this influential line of work has not studied whether policy changes may affect firms' investment performance, especially in the Asian region. In this paper, as far as we know, we provide the first systematic analysis of how the policy intervention by Asian regional governments has impacted on firms' investment spending. In doing so, we explore whether firms use banks and capital markets to simply adjust their capital structure or finance investment projects. This is important, as we provide a direct link between capital raising and firm-level growth. We also allow for the fact that firms of different riskiness and with varying levels of profits might respond to the policy initiative disproportionately. In other words, we consider whether financial constraints play a crucial role in firm performance around capital market raising activity.

The rest of the paper is organised as follows. [Section 2](#) provides a brief review of the relevant literature. In [Section 3](#), we describe the econometric modelling strategy. We present the data used in our empirical analysis along with summary statistics in [Section 4](#), and we report the econometric results in [Section 5](#). In [Section 6](#) we check the robustness of our findings and we provide concluding remarks in [Section 7](#).

## 2. Background literature

Asian bond markets are typically identified as under-developed and illiquid when compared with advanced industrial countries. Several developmental constraints have been cited in the literature that attempt to explain the growth of corporate bond markets in Asia. According to [Eichengreen and Luengnaruemitchai \(2006\)](#), minimum efficient scale, corruption, low level of bureaucracy and poor accounting standards were important reasons for the slow process of development. In addition, capital controls, taxation and limited availability of hedging instruments were some other obstacles in developing Asian bond markets

(Takeuchi, 2006). However, since the 1990s, many emerging countries in Asia have taken important steps to enhance and promote their financial markets. After recovery from the Asian crisis, the need to develop sound and more liquid bond markets to prevent further capital account crises was realised, and regional governments started contributing towards the development of local bond markets in Asia.

The most noteworthy policy intervention was undertaken by the Asia-Pacific policymakers to allow bond markets to develop in two waves since 2003. The first phase of the Asian Bond Fund (ABF) initiative, namely ABF-1, was introduced in June 2003, and USD 1 bn was fully invested in dollar and local currency denominated bonds in the Executive Meeting of East Asia and the Pacific (EMEAP) central bank economies.<sup>5</sup> The second phase of this initiative was launched in December 2004 and was called ABF-2. In the second wave USD 2 bn was invested in domestic bonds issued by sovereign and quasi-sovereign issuers in eight local currency markets of the regions where the eight EMEAP central banks operate. These markets include China, Hong Kong SAR, Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand. The ABF-2 initiative was aimed at improving size and liquidity in the Asian bond markets along with enhancing investor awareness and interest in Asian bonds. Our study makes use of this natural experiment to evaluate its influence on firms' composition of corporate finance.

A more detailed review of the financial systems in Asian countries is presented by Didier and Schmukler (2015). Using the market capitalisation of bonds as a percentage of GDP, they show that bond markets in East Asia expanded by almost 57% in the past decade. During this period the growth in Latin American markets was approximately 30%. Despite the substantial growth, private bond markets, including corporate and financial institutions in Asian economies, remain relatively small compared to G-7 economies. The banking system, as measured by total assets as a share of GDP, has increased by 47% in Asian economies over the past twenty years. In Latin America the increase was only 5% for the same period. Overall, these financial trends highlight the fact that Asian economies are more developed compared to Latin America, and this growth may be partly attributed to rapid financial improvements in the region in the past decade.

Moving to the literature which attempts to identify the main determinants of firms' financial structure, we note that there are a variety of firm-level and macroeconomic factors that influence firm financing. With respect to firm-level characteristics, size, age, collateral, profitability and riskiness are highlighted as important factors affecting firms' access to external finance (see Harris and Raviv, 1991; Myers, 2003; Bougheas et al., 2006). Business group affiliation (Shin and Park, 1999) and availability of credit information (Tang, 2009) are other factors impacting on firms' choice of capital structure. At the macroeconomic level, monetary policy shocks (Kashyap et al., 1993), institutional differences, the development of financial markets (Demirgüç-Kunt and Maksimovic, 2002; Fan et al., 2010) and higher costs and barriers to entry (Cetorelli and Strahan, 2006) are typically shown as important variables influencing firms' access to external finance.

The studies discussed above provide a useful background to explore the linkage between firms' access to external finance and Asian bond market initiatives. In the following sections, we explain our data and empirical strategy.

### 3. Empirical methodology

#### 3.1. The baseline model

To examine the impact of bond market policy initiatives on firms' access to external finance, we employ a difference-in-differences estimator.<sup>6</sup> More specifically, we evaluate the impact of the policy intervention by comparing differences in external finance composition before and after the policy change for firms in seven Asian economies that participated in this initiative (treatment), namely- Hong Kong SAR, Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand. We then compare these differences with comparable differences from a sample of firms in Taiwan (control), which did not participate in the policy initiative but faced a similar trajectory in their financing activities. Taiwan was excluded from the aforementioned initiatives because of political considerations (Swaine et al., 2007). Nevertheless, being a member of the Asian Development Bank, it was able to implement several reforms to liberalise, regulate and supervise its financial and banking sectors based on advice taken from the IMF, ASEAN+3 and other institutions. Hence, Taiwan was in a position to grow its bond market and reap the benefits of regional and global financial stability (Drysdale and Armstrong, 2010).

The dependent variables measure firms' financial choice and are based on the ratios of short-term debt to total debt (Bougheas et al., 2006) and long-term debt to total assets (Demirgüç-Kunt and Maksimovic, 1999).<sup>7</sup> The former ratio refers to access to bank finance versus market finance, while the latter ratio is more related to access to bond financing, compared to total assets held by the firms. These ratios help to remove demand-side influences, as increase in the demand of credit is likely

<sup>5</sup> EMEAP central banks include the Reserve Bank of Australia, People's Bank of China, Hong Kong Monetary Authority, Bank Indonesia, Bank of Japan, Bank of Korea, Bank Negara Malaysia, Reserve Bank of New Zealand, Bangko Sentral ng Pilipinas, Monetary Authority of Singapore and Bank of Thailand.

<sup>6</sup> Several studies use this methodology to estimate the impact of minimum wages on employment (Card and Krueger, 1994), the effect of grants and subsidies on exporting activity (Görg et al., 2008) and the role of the recent financial crisis in corporate investment (Duchin et al., 2010).

<sup>7</sup> Short-term debt is made up of the sum of bank overdrafts, short-term group and director loans, hire purchase, leasing and other short-term loans, but is predominantly bank finance. Long-term debt includes bonds, mortgages, loans and similar debt, which represent debt obligations due more than one year from the company's balance sheet date or due after the current operating cycle.

to affect both numerator and denominator, leaving the ratio unchanged (Bougheas et al., 2006). We begin by estimating the following standard difference-in-differences equations:

$$\frac{STD_{ijt}}{TD_{ijt}} = \alpha_0 + \alpha_1 Treat_j + \alpha_2 After_t + \alpha_3 Treat_j * After_t + \alpha_4 X_{ijt} + e_{ijt} \quad (1)$$

$$\frac{LTD_{ijt}}{TA_{ijt}} = \alpha_0 + \alpha_1 Treat_j + \alpha_2 After_t + \alpha_3 Treat_j * After_t + \alpha_4 X_{ijt} + e_{ijt} \quad (2)$$

where  $i = 1, 2, \dots, N$  refers to firms in country  $j$  at time  $t$ .  $\frac{STD_{ijt}}{TD_{ijt}}$  and  $\frac{LTD_{ijt}}{TA_{ijt}}$  are the ratios of short-term debt to total debt (%) and long-term debt to total assets (%), respectively.<sup>8</sup>  $Treat_j$  is a country dummy which takes a value of one if a country participates in the policy initiative, and zero otherwise.  $After_t$  is a time dummy which takes a value of one for the period 2005–2012, and zero otherwise. By observing the treatment after 2005, we are mainly focusing on the impact of ABF-2, introduced at the end of 2004. The ABF-2 initiative differs from the others as it involves the actual creation of local currency bond funds. The earlier ABF project was limited to dollar-denominated issues that are traded mostly in more developed international bond markets. The policy effect is given by the coefficient of the interaction term,  $Treat_j * After_t$ . This point estimate measures the difference in the choice of external finance between those firms that experienced a policy change and those that do not. If the policy initiative has a crucial effect on access to finance with a considerable difference between the control and treated groups, then it should have a significant coefficient value.

The models are estimated using difference-in-differences with firm fixed effects to control for unobserved heterogeneity at the firm level. Country dummies are included in the model to control for country-level differences, while time dummies interacted with industry dummies are included in order to control for all time-varying demand shocks at the industry level (Brown and Petersen, 2009; Brown et al., 2009; Tsoukalas et al., 2016). We cluster standard errors at the firm level as the observations over time might be correlated within firms. Finally,  $X$  is a vector which includes other explanatory factors both at the firm and country level, and  $e_{ijt}$  are the disturbance terms.

In vector  $X$  we use a number of firm-level and macro-economic variables which have been found to influence firms' choice of external finance. To begin with the firm-specific characteristics, size is measured as the natural logarithm of total assets (Mizen and Tsoukas, 2014; Almeida et al., 2016). Larger firms have better access to external finance as they are less financially constrained, while smaller firms are more dependent on short-term bank financing (Bougheas et al., 2006).

Firms' liquidity is measured as the ratio of current assets to current liabilities. According to Ozkan (2001), liquidity is likely to have a mixed impact on access to external financing. Higher liquidity might encourage firms to have higher debt ratios due to increased ability to meet short-term obligations, implying a positive relationship between liquidity and external finance. On the other hand, firms with higher liquidity might also reduce their debt access, exerting a negative impact on external finance.

We construct *gearing*, which is measured as total liabilities to shareholders' equity, to control for firms' indebtedness relative to their equity (Bougheas et al., 2006). Mizen and Tsoukas (2014) show that more leveraged firms are more likely to issue corporate bonds, while Bougheas et al. (2006) find that short-term debt declines with higher levels of gearing.

Following Mizen et al. (2012), the expansion rate of firms is measured as the ratio of investments to total assets. The literature postulates that faster-growing firms are more likely to issue bonds compared to firms with fewer opportunities for expansion (Datta et al., 2000). In addition, firms with higher expansion rates are likely to undertake bond issuance earlier (Hale and Santos, 2008). Firms' operating cycle is calculated as the ratio of net sales to net fixed assets. Firms with higher operating cycles depend more on short-term debt to finance their sales (Demirgüç-Kunt and Maksimovic, 1999). Finally, cash flow is measured as the ratio of earnings before extraordinary items plus depreciation and amortization to total assets (Almeida and Campello, 2010). Companies which display higher levels of cash flow or higher cash surplus are expected to reduce their leverage (Demirgüç-Kunt and Maksimovic, 1999).

In vector  $X$  we also control for macro-economic factors such as *GDP growth rate*, *legal regulation* and *balance of trade*. Amongst these factors, GDP growth rate and balance of trade (scaled by GDP) are measures of general economic development. Better economic conditions might encourage firms to shift towards non-debt liabilities, showing a negative effect on external finance. Firms in countries with higher levels of legal regulation are more likely to rely on external financing due to reduced information asymmetries, resulting in higher growth (La Porta et al., 1998) and effective financial contracts (Demirgüç-Kunt and Maksimovic, 1999).

### 3.2. Access to external finance and investment spending

In this section, we explore the influence of external finance on firms' investment spending in the post-policy period.<sup>9</sup> It is particularly interesting to examine the response of investment to variations of debt, as the Asian Bond Fund initiatives are expected to encourage long-term debt issuance. We argue that uptake of long-term debt in the post-policy period is likely to

<sup>8</sup> We do not find any evidence of persistence in the debt ratios and hence we do not opt for modelling the debt ratios in a dynamic setting.

<sup>9</sup> We also investigate the direct impact of the ABF policies on firms' investment spending and find a positive and significant impact, implying an increase in investment spending by firms after these policies were introduced.



have a positive effect on firms' investment spending. The rationale is that firms have incentives to seek flexibility in finance due to the constraints on liquidity internally and the benefits of diversification of financial sources, as in [Rajan \(1992\)](#).<sup>10</sup> The latter should lead to more efficient capital allocation and better risk sharing, implying a positive association with investment spending. To test this hypothesis, we formulate an empirical model where the dependent variable is investment spending (*Inv*), measured as the ratio of annual capital expenditure over total assets ([Duchin et al., 2010](#)). The model is estimated as follows:

$$\begin{aligned} \text{Inv}_{ijt} = & \alpha_0 + \alpha_1 \text{Treat}_j + \alpha_2 \text{After}_t + \alpha_3 \text{Lev}_{ijt} + \alpha_4 \text{Treat}_j * \text{After}_t * \text{Lev}_{ijt} + \alpha_5 \text{Treat}_j * \text{After}_t + \alpha_6 \text{After}_t * \text{Lev}_{ijt} \\ & + \alpha_7 \text{Treat}_j * \text{Lev}_{ijt} + \alpha_8 \text{Salesgrowth}_{ijt} + \alpha_9 \text{Cashflow}_{ijt} + e_{ijt}, \end{aligned} \quad (3)$$

where *Lev* refers to the measures of firms' external finance, i.e. both short-term and long-term debt ratios as defined above. *Cashflow* is firms' cash flow and *salesgrowth* controls for firms' investment opportunities. The main variable of interest is the interaction term  $\text{Treat}_j * \text{After}_t * \text{Lev}_{ijt}$ , which captures the impact of post-policy access to external finance on firms' investment spending for the treated group. Due to data constraints on the market value of assets (e.g. number of shares outstanding and stock price) in Global Compustat we are unable to construct Tobin's Q (see also [Baum et al., 2011](#)), but investment opportunities are controlled for in two ways. First, following [Konings et al. \(2003\)](#) and [Tsoukalas et al. \(2016\)](#), sales growth is used as a proxy for Tobin's Q. Second, time dummies interacted with industry dummies in all the specifications are used as an indirect way of controlling for investment opportunities, or more general demand factors (see [Brown and Petersen, 2009](#); [Brown et al., 2009](#); [Tsoukalas et al., 2016](#)).

### 3.3. Accounting for firm-level heterogeneity

Intuitively, not all firms are expected to benefit equally from the above-mentioned policy initiatives. A large and growing body of literature argues that capital market imperfections affect firm behaviour. The seminal study by [Fazzari et al. \(1988\)](#) was amongst the first to highlight the importance of differences across firms in relation with financial constraints originating from the imperfections of the capital market. They conclude that financial constraints matter for corporate investment. [Bris et al. \(2014\)](#) find that larger firms in the Euro area benefitted the most from financial integration. Consistent with this result, [Gozzi et al. \(2010\)](#) find that larger firms have better financing from international capital markets. In a similar vein, [Stiebale \(2011\)](#) further stresses that financially constrained firms face difficulties in obtaining external finance. We also argue that firms that face financial constraints might be less well positioned to take advantage of the policy initiatives in Asia, since these firms are more susceptible to information asymmetry effects. It is well known that there is little public information available for financially constrained firms, and it is difficult for financial institutions to gather this information. Financially constrained firms may have limited options for raising external finance. We hypothesise, therefore, that financially unconstrained firms are more likely to reap the benefits of a policy change.

To test this hypothesis, we divide our firms into constrained and unconstrained groups using two main criteria: profitability and coverage ratio. The former separation criterion, as measured by the ratio of earnings before interest and taxes relative to total assets, has been used in the literature to indicate financial constraints (see [Baker and Wurgler, 2002](#) and [Livdan et al., 2009](#)). The latter sorting device is measured as earnings before interest and taxes over total debt ([Mizen and Tsoukas, 2012](#)). Hence, this classification scheme captures project quality, or, more broadly, firms' creditworthiness.<sup>11</sup> As the policy initiative might be related to unobserved within-firm changes, firms are divided into constrained and unconstrained categories using the pre-policy period of 1996–2004.<sup>12</sup> Firms are classified as constrained if their profits and coverage ratio are below the 50th percentile of the distribution in the pre-policy period. Hence, our regressions are reported separately for constrained and unconstrained firms.

## 4. Data and summary statistics

### 4.1. Data

Our data-set combines five different sources, including Dealogic Bondware, Bloomberg, Standard and Poor's Compustat Global, the Global Financial database and the IMD World Competitiveness Yearbook (WCY). Our data-set covers eight Asian economies, namely Hong Kong SAR, Indonesia, Korea, Malaysia, the Philippines, Singapore, Taiwan and Thailand, over the period 1996 to 2012.<sup>13</sup>

<sup>10</sup> In other words, for large investment projects firms will prefer to tap the public bond market, and there is a choice between bank or market finance, driven by differences in the cost of finance between the two.

<sup>11</sup> Interest coverage was used by [Guariglia \(1999\)](#) as an indicator of financial constraints to identify differences in inventory investment.

<sup>12</sup> A firm is classified as constrained or unconstrained in the policy and post-policy period from 2005–2012 using 2004 values, one year prior to the onset of the policy, as firm variables are likely to be endogenous to the choices made by firms.

<sup>13</sup> We do not take China into consideration due to its disparities with other East Asian economies in terms of growth, capital account convertibility and restricted financial markets. Corporate savings in China are higher, due to the domination of state-owned banks and restricted equity market, which favours large firms by improving their retained earnings and profitability ([Lin, 2009](#)). In addition, the repressed financial system in China provides cheap capital (lower interest rates), which again favours large firms ([Prasad, 2009](#)).

Bondware is used to identify corporate bonds issued in international markets and to assemble data relating to issue date, maturity date, outstanding amount and currency.<sup>14</sup> We use Bloomberg to categorise similar data for firms that issue bonds in the Asian domestic markets. The data thus covers bond issues of firms denominated in local currency as well as in foreign currency, mainly US dollars.

Balance sheet and profit (loss) data are taken from Compustat Global, which provides accounting information on active and inactive companies throughout the world. Our initial sample was made up of a total of 71,792 annual observations of 7436 companies. Finally, the data for economic factors such as GDP growth rate, balance of trade and legal regulation are drawn from the Global Financial database and the WCY.

Following normal selection criteria, companies with incomplete records of explanatory variables and negative sales are excluded from the data. In addition, observations in the 1% from upper and lower tails of the distribution of the regression variables are excluded to control for the potential influence of outliers. Finally, the panel has an unbalanced structure, with a total of 62,237 annual observations corresponding to 518 firms in Hong Kong SAR, 451 in Indonesia, 1599 in Korea, 1219 in Malaysia, 253 in the Philippines, 861 in Singapore, 1745 in Taiwan and 640 in Thailand. Our sampled firms operate between 1996 and 2012 in different sectors, such as manufacturing, utilities, resources, services and financials.

## 4.2. Descriptive analysis

Table 1 presents summary statistics for all the variables, distinguishing between treated and control groups both before and after the policy initiative. In column 1 we report values for the whole sample. In columns 2 and 3 we show statistics for the treated group before and after the policy change, while column 4 reports p-values associated with the t-test for the equality of means of the corresponding variables. It can be seen that short-term debt has increased modestly for the treatment group after the policy change, while long-term debt values show considerable improvement after the introduction of the policy. The difference in the long-term debt is significant at the 1% level. In columns 5 and 6, we present statistics for the pre- and post-policy period for the control group, while column 7 reports p-values for the differences of the means. The short-term debt rises slightly after the policy change, but its increase is significant only at the 10% level, while long-term debt declines significantly after the policy implementation. With respect to other variables, the statistics reveal different characteristics across groups. As for country-specific variables, the treated group displays higher GDP growth, lower legal regulation and higher balance of trade compared to the control group.

In Table 2 we report the time series analysis of the debt statistics (short- and long-term debt) for the two groups in each of the eight countries over the sample period. In Panel A we find that short-term debt for the treated group declined substantially in the early 2000s and rebounded post 2006, while it fell again in the later part of the sample period. On the other hand, short-term debt for the control group remains roughly constant over time, showing an increase in the last year of the sample period. As for long-term debt, reported in Panel B, economies in the treated group display an upward trend since the early 2000s, followed by a steady increase in the post-crisis years (with the exception of Korea and Singapore, which witness a drop in 2009 and 2010). We note that while countries that participated in the policy initiative experienced an increase in their long-term debt after the crisis, we are unable to find a large shift in response to the crisis, which might suggest that the cyclical effect was rather limited.<sup>15</sup> Finally, the control group, once again, does not show any evidence of a significant increase in long-term debt, with the only exception being the year 2012.

Overall, two points can be highlighted from these preliminary statistics. First, there is a noticeable difference between the control and treated groups in terms of their debt components. Second, there is an increase in the level of long-term debt after the introduction of the policy initiatives for the treated group. In the following sections, a formal regression analysis framework tests the role of the policy initiative in firms' composition of external finance.

## 5. Empirical results

### 5.1. The baseline model

Table 3 reports the results of a difference-in-differences (DD) estimator for the baseline models. The main variable of interest is the DD estimate,  $Treat * After$ , which signifies the impact of the policy initiatives on the treated group compared to the firms in the control group. We find evidence that the debt structure responded significantly to the introduction of the ABF initiative. More specifically, firms reduced the proportion of short-term debt to total debt, while increasing their uptake of long-term debt in relation to total assets. To ascertain the magnitude of the DD coefficient, we calculate percentage point effects by dividing the coefficient value (marginal effect) with the predicted probability of the model. We show that the introduction of the policy in the treated group led to a reduction in firms' access to short-term debt by 4.87% and an increase in firms' uptake of long-term

<sup>14</sup> The definition of corporate bonds is in line with recent studies on Asian bond markets (see Mizen and Tsoukas, 2014) and includes all non-government long-term issues in a given currency.

<sup>15</sup> We will return to this point in our robustness tests analysis, where we show that the shift in long-term debt was policy-driven rather than influenced by cyclical factors.



**Table 1**  
Statistics for all explanatory variables.

Variable	Whole sample	Treated group			Control group		
		After = 0	After = 1	Diff	After = 0	After = 1	Diff
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Short-term debt (in USD bn)	47.03 (266.61)	56.28 (287.67)	62.83 (312.48)	0.022	2.17 (5.84)	2.51 (10.93)	0.060
Long-term debt (in USD bn)	52.29 (328.68)	59.25 (329.94)	72.44 (401.02)	0.000	2.70 (10.44)	2.05 (10.09)	0.001
Size	8.41 (3.11)	8.11 (3.34)	8.63 (3.47)	0.000	8.41 (1.50)	8.29 (1.44)	0.000
Liquidity	2.12 (1.89)	1.88 (1.73)	2.20 (2.04)	0.000	1.98 (1.32)	2.24 (1.49)	0.000
Gearing	1.57 (2.40)	1.83 (2.74)	1.54 (2.29)	0.000	1.17 (1.33)	1.11 (1.27)	0.006
Expansion rate	0.48 (0.35)	0.47 (0.36)	0.48 (0.36)	0.653	0.47 (0.32)	0.49 (0.33)	0.000
Operating cycle	6.36 (12.84)	4.45 (9.02)	6.99 (13.82)	0.000	7.54 (18.16)	9.32 (23.05)	0.000
Cash flow	9.10 (8.47)	9.09 (8.25)	9.14 (8.65)	0.572	9.80 (7.74)	8.82 (7.88)	0.000
Investment spending	5.24 (5.40)	5.37 (5.52)	5.20 (5.30)	0.003	6.14 (34.29)	6.45 (102.38)	0.854
Sales growth	0.08 (0.28)	0.08 (0.29)	0.09 (0.28)	0.334	0.15 (0.31)	0.06 (0.31)	0.000
GDP growth	4.44 (3.64)	4.34 (4.46)	4.53 (3.10)	0.033	4.77 (1.92)	4.21 (3.81)	0.000
Legal regulation	5.50 (3.64)	6.02 (1.86)	5.38 (2.00)	0.000	5.41 (0.48)	4.90 (0.51)	0.000
Balance of trade	6.25 (9.10)	7.20 (9.95)	5.87 (10.48)	0.000	5.56 (2.09)	5.69 (1.53)	0.000
Observations	62,237	19,810	28,565		4634	9498	

Notes: The table presents sample means with standard deviations in parentheses. 'Treated group' is a country dummy which refers to firms in countries which participated in ABF, ABF-2 or ABMI. 'Control group' refers to all other firms. 'After' is a dummy that takes value 1 for the period 2005–2012 and 0 otherwise. Diff is the p-value associated with the t-test for the equality of means of the corresponding variables. Size is the natural logarithm of total assets. Liquidity is the ratio of current assets over current liabilities. Gearing is the ratio of total liabilities to shareholder's equity. Expansion rate is the ratio of total investments to total assets. Operating cycle is the ratio of net sales to net fixed assets. Cash flow is the ratio of earnings before extraordinary items plus depreciation and amortization to total assets. Investment spending is the ratio of capital expenditures to total assets. Sales growth is the annual growth in sales. GDP growth is the annual percentage growth rate of GDP at market prices based on constant local currency. Legal regulation is an index of 0 to 10 based on a survey question of 'The legal and regulatory framework encourages the competitiveness of enterprises'. Balance of trade is the sum of exports and imports of goods and services measured as a share of GDP. Also see Appendix A2 for precise definitions of all variables.

debt by 11.96%.<sup>16</sup> This finding suggests that firms issued long-term debt that they would not have done in the absence of the policy change. Our findings concur with evidence presented in [Mizen and Tsoukas \(2014\)](#), who show that the policy initiatives of ABF, ABF-2 and ABMI had a significant effect on a firm's decision of bond issuance.

Focusing on firm-specific characteristics, we observe that larger firms reduce the ratio of short-term debt to total debt and increase the uptake of long-term debt over total assets. This is evident from the point estimates on firm size for both regressions. We echo [Bougheas et al.'s \(2006\)](#) finding that size is an important determinant of access to bank and market debt. We also find that both *liquidity* and *gearing* enhance access to longer-term debt, reducing the fraction of short-term debt to total debt while increasing long-term debt in relation to total assets. The finding for the former indicator is in line with [Ozkan \(2001\)](#), who shows that firms with higher liquidity improve access to external finance. The latter result is similar to [Mizen and Tsoukas \(2014\)](#), who find that highly indebted firms are more likely to issue corporate bonds.

The ratio of investment to total assets (*expansion rate*) increases the uptake of long-term debt and decreases borrowing in the short term, which comes primarily from banks. This indicates that firms with higher investments are more likely to opt for long-term debt issuance in order to finance these projects, similar to the findings of [Hale and Santos \(2008\)](#). Greater short-term debt over total debt is observed for firms with a higher *operating cycle*. On the other hand, firms decrease their long-term debt to total debt when the operating cycle improves. This suggests that firms depend more on short-term debt than long-term debt to finance their increasing sales. Finally, *cash flow* enters with a negative coefficient on both short-term and long-term debt regressions, which shows that firms with substantial cash flow require less in terms of external finance. These results are in line with [Demirgüç-Kunt and Maksimovic \(1999\)](#).

<sup>16</sup> This is calculated as follows: dividing the coefficient of −3.110, which corresponds to the short-term debt regression, with the predicted probability of this model (63.80) implies a reduction of 4.87%. Similarly, for the long-term debt regression, the magnitude of 11.96% is calculated by dividing the coefficient value (1.073) with the corresponding predicted probability (8.97).

**Table 2**  
Debt statistics by year and country.

Panel A:		Short-term debt (in USD bn)						
Year	HK	ID	KR	MY	PH	SG	TH	TW
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1996	0.98 (1.84)	134.73 (171.16)	347.38 (670.72)	0.20 (0.82)	1.64 (2.77)	0.09 (0.19)	3.32 (10.27)	3.38 (5.08)
1997	0.67 (1.29)	306.77 (470.48)	406.72 (897.38)	0.22 (1.09)	2.31 (4.90)	0.09 (0.21)	3.23 (12.21)	3.82 (5.69)
1998	0.71 (1.51)	373.94 (540.56)	375.03 (736.01)	0.18 (0.52)	1.87 (3.68)	0.07 (0.18)	2.87 (10.67)	4.24 (5.96)
1999	0.62 (1.31)	303.62 (775.94)	319.39 (604.04)	0.15 (0.46)	1.58 (3.88)	0.07 (0.18)	2.41 (9.28)	4.54 (8.24)
2000	0.68 (1.74)	231.10 (587.65)	320.98 (686.40)	0.16 (0.71)	1.89 (4.17)	0.08 (0.32)	1.65 (3.90)	4.46 (6.49)
2001	0.66 (1.79)	225.34 (621.47)	235.56 (592.31)	0.16 (0.87)	2.21 (4.88)	0.07 (0.31)	1.48 (4.61)	3.98 (6.04)
2002	0.69 (2.82)	166.31 (441.94)	173.12 (380.18)	0.12 (0.40)	1.93 (4.46)	0.06 (0.24)	1.22 (3.79)	1.46 (3.82)
2003	0.70 (2.85)	168.61 (444.96)	150.47 (347.38)	0.11 (0.42)	2.50 (5.76)	0.05 (0.18)	1.52 (5.64)	1.52 (4.25)
2004	0.74 (3.02)	172.00 (390.44)	159.71 (456.66)	0.13 (0.52)	2.40 (6.04)	0.79 (12.41)	1.58 (5.71)	1.82 (7.38)
2005	0.72 (2.47)	161.47 (354.75)	164.70 (497.47)	0.15 (0.72)	3.10 (8.26)	1.13 (19.05)	1.46 (4.44)	2.22 (8.86)
2006	0.68 (1.90)	179.47 (476.74)	164.32 (516.86)	0.16 (0.85)	3.02 (7.98)	1.93 (33.90)	1.99 (5.87)	2.22 (8.83)
2007	0.99 (3.73)	213.83 (489.76)	169.11 (494.98)	0.12 (0.43)	2.92 (8.65)	1.33 (25.69)	2.05 (6.46)	2.59 (11.27)
2008	1.09 (3.02)	285.41 (664.23)	207.42 (547.61)	0.13 (0.48)	3.33 (9.42)	2.42 (47.80)	2.77 (8.81)	2.43 (9.74)
2009	1.13 (3.10)	262.98 (539.10)	228.67 (637.24)	0.11 (0.33)	3.05 (10.14)	2.86 (44.87)	2.59 (8.46)	2.07 (9.00)
2010	1.60 (3.73)	318.89 (727.36)	226.02 (619.96)	0.13 (0.38)	3.80 (11.87)	1.35 (14.80)	2.84 (10.88)	2.32 (10.24)
2011	1.98 (4.69)	348.99 (638.98)	163.55 (488.32)	0.16 (0.60)	4.54 (14.23)	1.63 (23.03)	4.58 (21.48)	2.84 (14.47)
2012	2.35 (5.18)	342.09 (608.86)	143.94 (383.71)	0.21 (0.79)	8.61 (17.06)	3.51 (40.96)	2.60 (7.64)	14.66 (31.12)
Panel B:		Long-term debt (in USD bn)						
1996	2.28 (5.22)	408.63 (1049.33)	276.58 (586.33)	0.21 (0.76)	4.32 (8.71)	0.15 (0.35)	3.46 (12.27)	3.29 (5.71)
1997	2.14 (7.01)	448.00 (824.62)	333.82 (718.73)	0.23 (0.99)	4.29 (11.78)	0.15 (0.44)	3.29 (13.27)	4.09 (8.17)
1998	2.16 (6.85)	341.13 (737.25)	351.23 (849.97)	0.23 (1.19)	3.86 (11.67)	0.15 (0.46)	2.92 (10.65)	5.03 (9.55)
1999	2.02 (6.99)	325.37 (677.51)	248.17 (539.17)	0.17 (1.10)	4.42 (13.74)	0.12 (0.39)	3.18 (12.30)	6.49 (19.16)
2000	2.19 (8.64)	219.05 (584.36)	231.45 (507.85)	0.16 (0.99)	5.98 (18.51)	0.12 (0.44)	3.29 (14.57)	5.78 (15.36)
2001	2.26 (9.86)	201.82 (448.05)	194.49 (553.91)	0.16 (1.04)	5.52 (16.56)	0.18 (0.92)	2.71 (10.88)	5.82 (16.42)
2002	2.19 (10.39)	248.99 (753.09)	174.20 (511.31)	0.19 (1.16)	5.26 (16.20)	0.16 (0.80)	2.66 (10.43)	1.53 (6.65)
2003	2.48 (15.15)	352.78 (888.14)	132.44 (440.01)	0.20 (1.19)	5.61 (16.31)	0.15 (0.79)	3.32 (12.69)	1.63 (6.60)
2004	2.44 (15.82)	363.91 (842.72)	138.40 (473.09)	0.22 (1.33)	5.51 (15.59)	2.08 (33.58)	3.31 (12.71)	1.57 (6.51)
2005	2.31 (14.48)	425.37 (990.38)	151.17 (498.95)	0.22 (1.26)	5.57 (15.03)	1.69 (29.12)	2.86 (12.54)	1.88 (8.20)
2006	2.84 (15.74)	368.81 (813.19)	149.56 (495.63)	0.24 (1.27)	5.11 (12.90)	4.36 (66.10)	3.16 (13.22)	1.89 (9.43)
2007	3.13 (16.19)	423.38 (880.64)	181.41 (718.09)	0.24 (1.32)	4.62 (12.65)	6.08 (98.22)	3.60 (14.73)	1.86 (9.11)
2008	3.39 (14.91)	423.29 (911.71)	183.30 (744.70)	0.26 (1.42)	5.71 (14.43)	5.83 (94.56)	3.82 (16.05)	1.91 (10.51)
2009	3.57 (15.31)	422.80 (899.76)	174.10 (613.37)	0.34 (1.83)	7.68 (18.40)	7.74 (117.90)	4.82 (21.67)	1.63 (8.83)

Table 2 (continued)

Panel B:		Long-term debt (in USD bn)						
Year	HK	ID	KR	MY	PH	SG	TH	TW
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
2010	4.04 (15.32)	417.13 (849.56)	161.37 (502.95)	0.35 (1.77)	10.63 (33.82)	4.36 (86.50)	5.55 (25.17)	1.68 (8.33)
2011	4.92 (15.11)	470.40 (999.88)	122.79 (471.91)	0.39 (1.79)	11.38 (36.51)	4.36 (77.25)	4.64 (20.50)	1.96 (10.00)
2012	7.14 (19.70)	585.47 (1144.99)	167.12 (562.07)	0.56 (2.47)	18.56 (34.65)	6.02 (89.09)	5.92 (25.60)	8.32 (19.29)

Notes: The table presents the sample means of debt statistics by year and country with standard deviations in parentheses. Country abbreviations are as follows: HK=Hong Kong, ID=Indonesia, KR=Korea, MY=Malaysia, PH=Philippines, SG=Singapore, TH=Thailand and TW=Taiwan.

On the country-specific determinants, we find that *GDP growth* is generally insignificant, but the *balance of trade* shows a positive effect on short-term debt and an insignificant effect on long-term debt. Improvements in the balance of trade, an indicator of the economic health of a country, increase access to external financing in the form of short-term debt. Finally, *legal regulation* registers a positive coefficient on the long-term debt to total debt ratio and a negative coefficient on the short-term debt to total assets ratio. This implies that with an improvement in a country's legal framework, firms are more likely to increase their long-term debt issuance rather than their short-term debt exposure.

### 5.2. Firm heterogeneity and the composition of external finance

In this section, we explore the link between the policy shift and firms' financing while taking into account firm-level heterogeneity. The results are reported in Table 4. Columns 1–2 present results for firms with low and high profits, followed by low and high coverage ratios in columns 3–4 for the short-term debt to total debt ratio. Similarly, results for the long-term debt to total assets ratio for different classification schemes are reported in columns 5–8. The estimation results provide evidence that constrained firms remain mainly unaffected by the policy change. On the other hand, greater long-term debt and less short-term debt was obtained by unconstrained firms after the policy initiative. In sum, we find that there was a significant response of the debt composition to the policy change. However, its effect was very heterogeneous across constrained and unconstrained firms. One explanation for the above finding is related to the fact that financially constrained firms typically have to defray higher external financing costs (see Fazzari et al., 1988). Hence, they are less likely to have access to external finance, as they face higher agency costs of borrowing from financial markets when compared with the cost of internal financing (Bernanke and Gertler, 1995).

In economic terms, after the introduction of the policy, unconstrained firms in the treated group reduced their access to short-term debt by around 9.45%–9.51 %, and increased their access to long-term debt by 18.25%–26.84 %, compared to unconstrained firms in the control group. The tests of equality for constrained and unconstrained firms show significant differences at the 5% level or better for both short- and long-term debt ratios. Thus, unconstrained firms were able to more readily reap the benefits of the policy change than their constrained counterparts.

### 5.3. The impact on investment spending

Table 5 reports the results of firms' post-policy investment spending for different measures of leverage. Column 1 summarises the results for short-term debt to total debt, while in column 2 leverage is measured as long-term debt to total assets. We find that the interaction term of leverage and *Treat \* After* is negative for firms' investment spending in column 1 and positive in column 2.<sup>17</sup> These point estimates, which are statistically significant at the 1% level, indicate that as firms' access to short-term debt over total debt was reduced after the policy implementation, firms curtailed their investment spending. On the contrary, firms' improved access to long-term debt after the policy intervention helped them to channel a larger share of long-term debt on their investment outlay. The magnitude of the interacted coefficients suggests that after the implementation of the policy, firms reduced their investment spending using short-term debt by 10.04%, and increased their investment spending using long-term debt by 67.65%.

With respect to other control variables, both sales growth and cash flow are positively signed with significant coefficients in the reported models. This result is in line with the bulk of empirical studies on investment (see for example Fazzari et al., 1988 and Wei and Zhang, 2008) which show that firms' cash flow per unit of capital is positively related to the rate of investment, even when investment opportunities are accounted for.

Overall, the results show a significant variation of investment in response to the introduction of the policy initiatives. Firms which were able to raise long-term debt benefitted the most with reference to investment spending. Consistent with our

<sup>17</sup> The term *After\*Lev* has been omitted from the specifications due to very high correlation with other variables, such as *Treat\*After\*Lev* and *Lev*.

**Table 3**

Policy initiative and composition of external finance.

	Dependent variable: STD/TD	Dependent variable: LTD/TA
	(1)	(2)
Treat*After	−3.110*** (−3.51)	1.073*** (3.79)
Size	−5.614*** (−10.46)	2.877*** (13.37)
Liquidity	−5.111*** (−19.77)	0.354*** (5.89)
Gearing	−0.732*** (−6.06)	1.209*** (15.21)
Expansion rate	−10.691*** (−7.17)	4.534*** (7.85)
Operating cycle	0.141*** (4.75)	−0.031*** (−4.00)
Cash flow	−0.105*** (−3.83)	−0.081*** (−9.08)
GDP growth	−0.047 (−0.70)	0.015 (0.59)
Legal regulation	−0.930*** (−3.23)	0.415*** (4.35)
Balance of trade	0.125** (2.53)	0.014 (0.82)
Predicted probability	63.80	8.97
N	42,117	46,061
R <sup>2</sup>	0.074	0.109
No. of firms	5912	6100

Notes: All specifications are estimated using the difference-in-differences estimator. In column 1 the dependent variable is the ratio of short-term debt to total debt (STD/TD). In column 2 the dependent variable is the ratio of long-term debt to total assets (LTD/TA). Treat\*After measures the policy effect. Size is the natural logarithm of total assets. Liquidity is the ratio of current assets over current liabilities. Gearing is the ratio of total liabilities to shareholder's equity. Expansion rate is the ratio of total investments to total assets. Operating cycle is the ratio of net sales to net fixed assets. Cash flow is the ratio of earnings before extraordinary items plus depreciation and amortization to total assets. GDP growth is the annual percentage growth rate of GDP at market prices based on constant local currency. Legal regulation is an index of 0 to 10 based on a survey question of 'The legal and regulatory framework encourages the competitiveness of enterprises'. Balance of trade is the sum of exports and imports of goods and services measured as a share of GDP. All regressions include firm fixed effects. The specifications further include country dummies and time dummies interacted with industry dummies. The figures reported in parentheses are robust t-statistics. The standard errors are clustered over firms.

\*\*\* Statistical significance is denoted at 1%.

\*\* Statistical significance is denoted at 5%.

\* Statistical significance is denoted at 10%.

findings, [Levinger et al. \(2014\)](#) show that the strong growth in Asia's corporate bond markets has made funds available for investment and expansion in recent years, along with deepening of capital markets and diversification of financing sources.

#### 5.4. Firm heterogeneity and investment spending

To get a clearer picture about which firms benefit in terms of investment spending, we categorise them into financially constrained and unconstrained groups, using the same criteria as in [Subsection 5.2](#). [Table 6](#) reports the results of post-policy investment spending and leverage. The results indicate that the policy initiative did not have any significant impact on constrained firms' investment spending. On the contrary, unconstrained firms reduced their investment spending using short-term debt by 9.78%–12.67 %, and increased their investment spending using long-term debt after the introduction of the policy by 88.50%–89.60 %. In addition, the tests of equality, reported at the foot of the table, do not show a significant difference between the two groups of firms when the short-term debt to total debt ratio is used to measure leverage. On the other hand, the tests display a significant difference between different types of firms at the 5% level or better for the long-term debt to assets ratio. In sum, we find, once again, that the unconstrained category of firms in the treated group benefitted the most from the policy initiative, in comparison to their counterparts in the control group.

#### 6. Robustness tests

We now put our findings through a battery of checks in order to investigate robustness. These additional checks involve estimation of our empirical models on a restricted sample period, controlling for global liquidity factors in the model, using different sub-samples and employing alternative estimators.

**Table 4**

Access to external finance and firm-level heterogeneity.

	Dependent variable: STD/TD				Dependent variable: LTD/TA			
	PROF = 0	PROF = 1	RISKY = 1	RISKY = 0	PROF = 0	PROF = 1	RISKY = 1	RISKY = 0
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treat*After	−0.332	−6.096***	−0.756	−6.152***	0.417	1.619***	−0.279	2.131***
	(−0.26)	(−4.53)	(−0.64)	(−4.23)	(0.89)	(4.45)	(−0.54)	(6.75)
Size	−5.354***	−6.435***	−5.558***	−6.302***	2.870***	2.971***	2.907***	2.406***
	(−5.64)	(−7.88)	(−6.16)	(−7.84)	(7.13)	(9.42)	(7.30)	(9.25)
Liquidity	−5.344***	−5.204***	−6.770***	−4.564***	0.362***	0.419***	1.086***	0.229***
	(−11.93)	(−15.70)	(−12.07)	(−14.72)	(3.31)	(6.45)	(6.48)	(4.31)
Gearing	−0.325**	−1.320***	−0.330**	−1.448***	0.782***	1.722***	0.790***	1.727***
	(−2.23)	(−6.14)	(−2.39)	(−5.97)	(7.83)	(13.14)	(8.52)	(12.06)
Expansion rate	−7.825***	−11.527***	−9.455***	−10.954***	3.668***	4.953***	4.708***	3.716***
	(−3.42)	(−5.77)	(−4.25)	(−4.87)	(3.99)	(6.65)	(4.94)	(5.55)
Operating cycle	0.138***	0.135***	0.124***	0.147***	−0.038***	−0.027***	−0.047***	−0.030***
	(2.93)	(3.36)	(2.71)	(3.43)	(−2.86)	(−2.74)	(−2.81)	(−3.51)
Cash flow	−0.191***	−0.062	−0.173***	−0.090**	−0.016	−0.104***	0.001	−0.061***
	(−4.09)	(−1.61)	(−3.82)	(−2.36)	(−0.98)	(−9.12)	(0.04)	(−6.23)
GDP growth	−0.130	−0.021	−0.179*	0.098	0.013	0.014	0.028	−0.004
	(−1.23)	(−0.23)	(−1.90)	(1.02)	(0.30)	(0.46)	(0.63)	(−0.14)
Legal regulation	−1.618***	−0.395	−1.129***	−0.538	0.366**	0.391***	0.276	0.338***
	(−3.41)	(−1.09)	(−2.60)	(−1.40)	(2.03)	(3.68)	(1.52)	(3.40)
Balance of trade	0.087	0.064	0.104	0.069	−0.017	0.032	−0.018	0.019
	(1.17)	(0.95)	(1.44)	(1.00)	(−0.61)	(1.62)	(−0.57)	(1.12)
Predicted probability	62.05	64.52	60.75	64.67	9.90	8.87	11.49	7.94
N	16,368	25,749	16,616	25,501	17,400	28,661	16,893	29,168
R <sup>2</sup>	0.086	0.077	0.116	0.066	0.085	0.132	0.116	0.113
No. of firms	2684	4980	2657	4929	2744	5186	2658	5151
Test of equality								
p-Value: Treat*After	0.002		0.004		0.042		0.000	

Notes: All specifications are estimated using the difference-in-differences estimator. In columns 1–4 the dependent variable is the ratio of short-term debt to total debt (STD/TD), while in columns 5–8 the dependent variable is the ratio of long-term debt to total assets (LTD/TA). *PROF* is a dummy variable which equals 1 if the firm's earnings before interest and taxes relative to total assets are above the 50th percentile of the distribution of the profits of all the firms in the pre-policy period of 1996–2004, and 0 otherwise. *RISKY* is a dummy variable which equals 1 if the firm's coverage ratio, measured as earnings before interest and taxes over total debt, is below the 50th percentile of the distribution of the coverage of all the firms in the pre-policy period of 1996–2004, and 0 otherwise. *Treat\*After* measures the policy effect. *Size* is the natural logarithm of total assets. *Liquidity* is the ratio of current assets over current liabilities. *Gearing* is the ratio of total liabilities to shareholder's equity. *Expansion rate* is the ratio of total investments to total assets. *Operating cycle* is the ratio of net sales to net fixed assets. *Cash flow* is the ratio of earnings before extraordinary items plus depreciation and amortization to total assets. *GDP growth* is the annual percentage growth rate of GDP at market prices based on constant local currency. *Legal regulation* is an index of 0 to 10 based on a survey question of 'The legal and regulatory framework encourages the competitiveness of enterprises'. *Balance of trade* is the sum of exports and imports of goods and services measured as a share of GDP. All regressions include firm fixed effects. The specifications further include country dummies and time dummies interacted with industry dummies. The figures reported in parentheses are robust t-statistics. The standard errors are clustered over firms.

\*\*\* Statistical significance is denoted at 1%.

\*\* Statistical significance is denoted at 5%.

\* Statistical significance is denoted at 10%.

### 6.1. Restricted sample period

Our results so far indicate that firms' debt composition responded strongly to the introduction of the policy initiative. One potential concern is that the shift to long-term financing might be driven by factors unrelated to the initiative. In particular, a substantial shift in the debt financing of Asian firms from bank lending to bond financing occurred in the midst of the financial crisis (2009), as banks interrupted their lines of credit (see for example Chan et al., 2011). To address this point, we remove the crisis years from the sample and consider only the period 1996 to 2008. If the policy effect remains significant, we can argue that the structural effect found in the main results was not influenced by the crisis years in our sample.

Table 7 illustrates the results when we shorten the sample period. We see that our findings are in line with previously reported results in Tables 3 to 6. Specifically, we are able to observe a significant increase (decrease) in long-term (short-term) debt for firms in the treatment group relative to firms in the control group. We also find that the effects were more pronounced for more profitable and less risky firms. Finally, we find that the use of long-term debt helped firms to raise their investment spending. Thus, we can conclude that our results are not affected when we remove the crisis years from the sample period, lending support to a structural rather than cyclical effect.

### 6.2. Controlling for global liquidity

The rapid expansion of the onshore bond market in Asia "in an effort to chase yields"(see Spiegel, 2012) can perhaps have a bearing on our findings. This is related to the term of global liquidity, or the ease of financing in global financial markets,

**Table 5**  
Investment spending.

	Dependent variable: INV	
	(1)	(2)
Treat*After*Lev	−0.523** (−2.26)	3.450*** (5.36)
Sales growth	0.820*** (8.74)	0.768*** (8.65)
Cash flow	0.032*** (6.12)	0.037*** (7.72)
Lev	−1.134*** (−4.90)	5.002*** (5.20)
Treat*After	0.487** (2.09)	−0.192 (−1.22)
Treat*Lev	−0.071 (−0.24)	−3.171*** (−2.91)
Predicted probability	5.21	5.10
N	39,300	42,926
R <sup>2</sup>	0.054	0.053
No. of firms	5675	5861

Notes: All specifications are estimated using the difference-in-differences estimator. The dependent variable is firm-level investment spending measured as the ratio of capital expenditures over total assets (INV). Lev is measured as the ratio of short-term debt to total debt (STD/TD) in column 1 and the ratio of long-term debt to total assets (LTD/TA) in column 2. Treat\*After\*Lev captures the impact of post-policy access to external finance on firms' investment spending for the treated group. Sales growth is the annual growth in sales. Cash flow is the ratio of earnings before extraordinary items plus depreciation and amortization to total assets. All regressions include firm fixed effects. The specifications further include country dummies and time dummies interacted with industry dummies. The figures reported in parentheses are robust t-statistics. The standard errors are clustered over firms.

\*\*\* Statistical significance is denoted at 1%.

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\* Statistical significance is denoted at 10%.

and has implications for firms, as they become less bank dependent (see [Turner, 2014](#) and [Bruno and Shin, 2015](#)). Therefore, we explicitly control for global liquidity, as measured by the BIS statistics on the cross-border credit growth in the Asia-Pacific region.<sup>18</sup> We include this variable to capture the market reactions to quantitative easing and tapering by the United States on emerging economies in terms of capital flows across borders.<sup>19</sup> The results are reported in [Table 8](#). We can see that even after controlling for global liquidity, which does not attain a significant coefficient value, our main results remain unchanged.

### 6.3. Broadening the control group

It could be argued that our results are sensitive to the construction of the control group, which is made up of firms operating in Taiwan. In this section, we address this issue by expanding our control group to include Vietnam, which did not participate in the policy initiative but had similar bond market development compared to the other economies in our treated group.<sup>20</sup> Vietnam requires various domestic market oriented regulatory reforms in order to improve efficiency and integrate into global and regional economic systems. It is also part of the ASEAN economies and has recently received technical assistance in this direction.

The results are shown in [Table 9](#).<sup>21</sup> In Panel A we confirm the significant and positive impact of the policy initiative on firms' access to long-term debt ratio and the negative impact on access to short-term debt ratio. Panel B validates that the policy initiative helped unconstrained firms to increase their access to long-term debt and reduce their short-term finance. Panel C shows that firms reduced their investment spending using short-term debt, while they increased their investment spending using long-term debt after the policy was introduced. Finally, in Panel D we find that the relationship between external finance and investment spending is stronger for unconstrained firms compared to their constrained counterparts. Thus, we confirm that our results are robust to an alternative control group which includes Vietnam.

<sup>18</sup> We were unable to construct alternative global liquidity indicators such as cross-border claims of banks on banks and claims of banks on non-banks due to missing data for Hong Kong, the Philippines and Thailand.

<sup>19</sup> Evidence shows that international credit to borrowers in the Asia-Pacific region held up in the aftermath of the crisis, compared to other emerging market economies. Total foreign claims on the Asia-Pacific region grew by 41% between mid-2008 and the second quarter of 2012 (BIS, 2012).

<sup>20</sup> [Fig. 1 \(b\)](#) depicts the evolution of bond market capitalisation in Vietnam relative to other Asian economies included in our sample. It can be seen that Vietnam has a very modest bond market, but its size grew in the later part of the sample period, an increase comparable to the rise in other economies.

<sup>21</sup> Legal regulation contains missing values for Vietnam and hence it has been dropped from the regressions.



**Table 6**

Investment spending and firm-level heterogeneity.

	Dependent variable: INV							
	PROF = 0	PROF = 1	RISKY = 1	RISKY = 0	PROF = 0	PROF = 1	RISKY = 1	RISKY = 0
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treat*After*Lev	−0.470 (−1.45)	−0.754** (−2.10)	−0.365 (−1.07)	−0.572* (−1.69)	1.422 (1.47)	5.117*** (5.42)	1.553* (1.87)	5.018*** (3.89)
Sales growth	0.729*** (5.54)	0.794*** (5.82)	0.742*** (5.16)	0.775*** (6.05)	0.684*** (5.48)	0.741*** (5.81)	0.725*** (5.17)	0.689*** (5.87)
Cash flow	0.016** (1.96)	0.021*** (2.78)	0.018** (2.20)	0.026*** (3.50)	0.022*** (2.89)	0.027*** (3.89)	0.022*** (2.90)	0.034*** (5.06)
Lev	−1.967*** (−4.79)	−0.650** (−2.28)	−1.920*** (−4.80)	−0.673** (−2.41)	6.854*** (4.71)	3.357** (2.45)	6.415*** (4.95)	3.869*** (2.74)
Treat*After	0.126 (0.37)	0.772** (2.26)	0.248 (0.73)	0.575* (1.70)	−0.371 (−1.57)	−0.111 (−0.49)	−0.232 (−0.94)	−0.165 (−0.79)
Treat*Lev	0.686 (1.42)	−0.295 (−0.70)	0.605 (1.25)	−0.481 (−1.18)	−3.220** (−1.99)	−3.002* (−1.88)	−4.014*** (−2.80)	−1.654 (−0.90)
Predicted probability	4.20	5.95	4.34	5.85	4.10	5.77	4.19	5.67
N	15,715	23,585	15,914	23,386	16,707	26,219	16,195	26,731
R <sup>2</sup>	0.051	0.068	0.058	0.064	0.050	0.065	0.058	0.062
No. of firms	2542	4588	2513	4556	2594	4787	2513	4769
Test of equality								
p-Value: Treat*After*Lev	0.575		0.678		0.006		0.023	

Notes: All specifications are estimated using the difference-in-differences estimator. The dependent variable is firm-level investment spending measured as the ratio of capital expenditures over total assets (INV). Lev is measured as the ratio of short-term debt to total debt (STD/TD) in columns 1–4 and the ratio of long-term debt to total assets (LTD/TA) in columns 5–8. *PROF* is a dummy variable which equals 1 if the firm's earnings before interest and taxes relative to total assets are above the 50th percentile of the distribution of the profits of all the firms in the pre-policy period of 1996–2004, and 0 otherwise. *RISKY* is a dummy variable which equals 1 if the firm's coverage ratio, measured as earnings before interest and taxes over total debt, is below the 50th percentile of the distribution of the coverage of all the firms in the pre-policy period of 1996–2004, and 0 otherwise. Treat\*After\*Lev captures the impact of post-policy access to external finance on firms' investment spending for the treated group. Sales growth is the annual growth in sales. Cash flow is the ratio of earnings before extraordinary items plus depreciation and amortization to total assets. All regressions include firm fixed effects. The specifications further include country dummies and time dummies interacted with industry dummies. The figures reported in parentheses are robust t-statistics. The standard errors are clustered over firms.

\*\*\* Statistical significance is denoted at 1%.

\*\* Statistical significance is denoted at 5%.

\* Statistical significance is denoted at 10%.

#### 6.4. Placebo tests

We make allowance for the fact that bond markets in Asia have followed an upward trajectory since the early 2000s. It is possible, therefore, that our findings are influenced by some pre-policy trend. To check if this underlying trend had any effect on our results, we conduct the difference-in-differences technique for the pre-policy period of 1996–2004, as in [Imberman and Kugler \(2012\)](#). Specifically, instead of the policy taking place after 2005, it is assumed that it took place from 2002 to 2004.<sup>22</sup> If there are any pre-existing trends, then there should be a significant impact of the policy on access to finance. On the other hand, if we fail to identify any significant effects for these placebo time periods, then this lends support to the credibility of the chosen treatment period.<sup>23</sup>

Table 10 presents the results, which demonstrate an insignificant impact of the policy initiative on both short-term and long-term debt ratios. This quantitatively unimportant finding is observed for both constrained and unconstrained firms. Further, the results of post-policy investment spending and leverage show an insignificant effect of firms' leverage on post-policy investment outlays for both constrained firms and their counterparts. In sum, the placebo tests confirm the validity of our difference-in-differences identification strategy.

#### 6.5. Employing a matching estimator

We account for differences between firms in the treated group compared to those in the control group. To achieve ex-ante comparability across firms, we employ Leuven and Sianesi's (2003) propensity score matching procedure, as implemented by [Marosi and Massoud \(2008\)](#). The main concept of this estimator is to identify firms from the treated group and then rely on

<sup>22</sup> In other words, these time periods are chosen at random and the true effect for these years is known to be zero. Difference-in-differences tests are also performed for the periods after 1999, 2002 and 2003. The results show almost similar results both quantitatively and qualitatively as the 2002–2004 reform period.

<sup>23</sup> All our models include time dummies to capture any trends prior to the treatment which would not be picked up by other variables. We find that year effects are non-uniform, and we can reject the null hypothesis that the coefficients are equal across all time periods.

**Table 7**

Robustness: restricted sample period.

Panel 1:	Dependent variable: STD/TD				Dependent variable: LTD/TA			
	(1)				(2)			
Treat*After	−3.937*** (−4.51)				1.115*** (4.01)			
N	29,072				31,515			
R <sup>2</sup>	0.084				0.111			
Panel 2:	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treat*After	−1.702 (−1.35)	−6.056*** (−4.53)	−1.616 (−1.39)	−6.905*** (−4.90)	0.536 (1.19)	1.650*** (4.65)	−0.101 (−0.20)	2.147*** (7.02)
N	12,580	16,492	12,790	16,282	13,259	18,256	12,889	18,626
R <sup>2</sup>	0.101	0.085	0.135	0.071	0.086	0.152	0.114	0.131
Test of equality								
p-Value: Treat*After	0.016				0.000			
Dependent variable: INV								
Panel 3:	(1)				(2)			
Treat*After*Lev	−0.467* (−1.75)				2.783*** (3.74)			
N	26,194				28,365			
R <sup>2</sup>	0.040				0.039			
Panel 4:	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treat*After*Lev	−0.220 (−0.62)	−0.565 (−1.40)	−0.274 (−0.73)	−0.460 (−1.19)	0.431 (0.42)	4.361*** (3.89)	1.326 (1.45)	4.852*** (3.19)
N	11,737	14,457	11,903	14,291	12,369	15,996	12,003	16,362
R <sup>2</sup>	0.055	0.037	0.062	0.033	0.054	0.036	0.062	0.033
Test of equality								
p-Value: Treat*After*Lev	0.529				0.046			

Notes: All specifications are estimated using the difference-in-differences estimator. The sample period is restricted from 1996 to 2008. In column 1 of Panel 1 the dependent variable is the ratio of short-term debt to total debt (STD/TD), while in column 2 of Panel 1 the dependent variable is the ratio of long-term debt to total assets (LTD/TA). In columns 1–4 of Panel 2 the dependent variable is the ratio of short-term debt to total debt (STD/TD), while in columns 5–8 of Panel 2 the dependent variable is the ratio of long-term debt to total assets (LTD/TA). In Panels 3 and 4 the dependent variable is firm-level investment spending measured as the ratio of capital expenditures to total assets (INV). All regressions include firm fixed effects. The specifications further include country dummies and time dummies interacted with industry dummies. The figures reported in parentheses are robust t-statistics. The standard errors are clustered over firms. The remaining specifications, which are not reported for brevity, are identical to those in Tables 3 to 6.

\*\*\* Statistical significance is denoted at 1%.

\*\* Statistical significance is denoted at 5%.

\* Statistical significance is denoted at 10%.

the control group to find the best possible match based on a number of observable characteristics.<sup>24</sup> Matching is done based on non-categorical variables, such as size, liquidity, leverage, expansion rate, operating cycle and cash flow, using caliper 0.001.<sup>25</sup> We use the pre-treatment (one year before the policy was introduced) values of the above-mentioned variables.

The results are reported in Table 11; they confirm that firms reduced their access to short-term debt and increased their access to long-term debt. We further corroborate that the policy initiative helped unconstrained firms to increase their access to long-term debt and reduce their short-term finance. Further results in Panel C show that firms reduced their investment outlay using short-term debt, while they increased their investment spending using long-term debt after the policy was introduced. Finally, in Panel D we find that the relationship between external finance and investment spending is stronger for unconstrained firms compared to their constrained counterparts. Thus, our results are robust to a matching technique.

<sup>24</sup> We select one matched control observation for each treated observation without replacement, which means that once a control observation has been selected, that control observation is no longer available for consideration as a potential match for subsequent treated observations. Matching without replacement increases the efficiency of matching, compared to matching with replacement. However, despite theoretical differences several studies have provided evidence that the number of matches and the choice of matching with or without replacement has a minimal effect on the treatment effect's bias and efficiency (Stuart, 2010).

<sup>25</sup> After the matching procedure, there are no statistically significant differences in the pre-policy mean values of the covariates across treatment and control groups. Moreover, our results are robust to alternative caliper values.

**Table 8**

Robustness: global liquidity.

Panel 1:	Dependent variable: STD/TD				Dependent variable: LTD/TA			
	(1)				(2)			
Treat*After	−3.640*** (−4.10)				1.301*** (4.64)			
Global liquidity	−0.013 (−0.86)				−0.002 (−0.40)			
N	37,922				41,673			
R <sup>2</sup>	0.078				0.099			
Panel 2:	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treat*After	−0.920 (−0.71)	−6.843*** (−5.02)	−1.353 (−1.12)	−6.906*** (−4.71)	0.709 (1.51)	1.912*** (5.28)	−0.023 (−0.04)	2.348*** (7.42)
Global liquidity	−0.016 (−0.69)	−0.005 (−0.26)	−0.023 (−1.04)	−0.008 (−0.44)	0.008 (1.19)	−0.005 (−1.04)	0.008 (1.09)	−0.006 (−1.17)
N	14,310	23,612	14,488	23,434	15,289	26,384	14,764	26,909
R <sup>2</sup>	0.088	0.082	0.120	0.068	0.075	0.124	0.112	0.108
Test of equality								
p-Value: Treat*After	0.002		0.003		0.046		0.000	
Dependent variable: INV								
Panel 3:	(1)				(2)			
Treat*After*Lev	−0.740*** (−3.03)				3.796*** (5.52)			
Global liquidity	−0.001 (−0.34)				−0.000 (−0.15)			
N	35,828				39,292			
R <sup>2</sup>	0.046				0.045			
Panel 4:	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treat*After*Lev	−0.471 (−1.37)	−0.933** (−2.43)	−0.520 (−1.42)	−0.695* (−1.94)	1.565 (1.53)	4.571*** (4.37)	1.840** (2.04)	3.517** (2.31)
Global liquidity	−0.004 (−1.00)	0.002 (0.63)	−0.003 (−0.73)	0.001 (0.40)	−0.004 (−1.14)	0.003 (0.87)	−0.002 (−0.61)	0.002 (0.48)
N	13,928	21,900	14,064	21,764	14,872	24,420	14,344	24,948
R <sup>2</sup>	0.033	0.065	0.035	0.062	0.034	0.062	0.035	0.060
Test of equality								
p-Value: Treat*After*Lev	0.368		0.735		0.039		0.342	

Notes: All specifications are estimated using the difference-in-differences estimator. The table reports results using additional control variables. Global liquidity is the cross border credit growth in the Asia Pacific region. In column 1 of Panel 1 the dependent variable is the ratio of short-term debt to total debt (STD/TD), while in column 2 of Panel 1 the dependent variable is the ratio of long-term debt to total assets (LTD/TA). In columns 1–4 of Panel 2 the dependent variable is the ratio of short-term debt to total debt (STD/TD), while in columns 5–8 of Panel 2 the dependent variable is the ratio of long-term debt to total assets (LTD/TA). In Panels 3 and 4 the dependent variable is firm-level investment spending measured as the ratio of capital expenditures to total assets (INV). All regressions include firm fixed effects. The specifications further include country dummies and time dummies interacted with industry dummies. The figures reported in parentheses are robust t-statistics. The standard errors are clustered over firms. The remaining specifications, which are not reported for brevity, are identical to those in Tables 3 to 6.

\*\*\* Statistical significance is denoted at 1%.

\*\* Statistical significance is denoted at 5%.

\* Statistical significance is denoted at 10%.

## 6.6. Addressing potential endogeneity concerns

One might argue that the policy initiative is triggered by an unobserved factor that also results in increased issuance of bonds. For example, financial liberalisation may simultaneously improve the financial development of a country and access to external credit. Alternatively, policy reforms are more likely to take place when there is an improvement in access to credit. This section considers an instrumental variable method (two-stage least squares 2SLS) to deal with the potential (residual) endogeneity of our explanatory variables and the bond market policy initiative. The identification of the policy initiative requires an exogenous variable which is correlated with the policy of bond market development but does not directly impact on firms' access to external finance. As a plausible exogenous instrument for the policy initiative, we use the "Entente Alliances". This index takes a value of one whenever two countries are common members of, or signatories to, an entente or alliance in any given time period,

**Table 9**

Robustness: broadening the control group.

Panel 1:								
Dependent variable: STD/TD					Dependent variable: LTD/TA			
(1)					(2)			
Treat*After	−2.753*** (−3.16)				0.868*** (3.07)			
N	43,881				47,939			
R <sup>2</sup>	0.070				0.105			
Panel 2:								
	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treat*After	−0.027 (−0.02)	−5.417*** (−4.13)	−0.667 (−0.56)	−5.448*** (−3.82)	0.283 (0.60)	1.354*** (3.72)	−0.297 (−0.58)	1.892*** (6.01)
N	17,361	26,520	17,627	26,254	18,440	29,499	17,918	30,021
R <sup>2</sup>	0.078	0.072	0.109	0.061	0.084	0.122	0.114	0.104
Test of equality								
p-Value: Treat*After	0.003		0.010		0.070		0.000	
Dependent variable: INV								
Panel 3:					Panel 4:			
(1)					(2)			
Treat*After*Lev	−0.540** (−2.34)				3.241*** (5.01)			
N	40,217				43,927			
R <sup>2</sup>	0.053				0.052			
	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treat*After*Lev	−0.401 (−1.27)	−0.863** (−2.40)	−0.326 (−0.97)	−0.701** (−2.07)	0.999 (1.05)	5.162*** (5.42)	1.259 (1.52)	5.024*** (3.79)
N	16,267	23,950	16,468	23,749	17,301	26,626	16,762	27,165
R <sup>2</sup>	0.049	0.066	0.056	0.062	0.048	0.065	0.055	0.062
Test of equality								
p-Value: Treat*After*Lev	0.336		0.432		0.000		0.016	

Notes: All specifications are estimated using the difference-in-differences estimator. The control group includes both Taiwan and Vietnam. In column 1 of Panel 1 the dependent variable is the ratio of short-term debt to total debt (STD/TD), while in column 2 of Panel 1 the dependent variable is the ratio of long-term debt to total assets (LTD/TA). In columns 1–4 of Panel 2 the dependent variable is the ratio of short-term debt to total debt (STD/TD), while in columns 5–8 of Panel 2 the dependent variable is the ratio of long-term debt to total assets (LTD/TA). In Panels 3 and 4 the dependent variable is firm-level investment spending measured as the ratio of capital expenditures to total assets (INV). All regressions include firm fixed effects. The specifications further include country dummies and time dummies interacted with industry dummies. The figures reported in parentheses are robust t-statistics. The standard errors are clustered over firms. The remaining specifications, which are not reported for brevity, are identical to those in Tables 3 to 6.

\*\*\* Statistical significance is denoted at 1%.

\*\* Statistical significance is denoted at 5%.

\* Statistical significance is denoted at 10%.

and zero otherwise. The intuition is that a country is more likely to adopt reform policies when political allies have already successfully implemented similar policies (Tressel and Detragiache, 2008).<sup>26</sup>

In addition, we assume that all firm-level variables used in the model are potentially endogenous, and they are instrumented using their own values lagged twice. It is generally agreed that lagged variables (which are often referred to as ‘internal’ instruments) are distributed independently of the error process and that they are sufficiently correlated with the included endogenous regressors. Hence, they are frequently used as instruments in the literature. The validity and relevance of the instruments for both the policy and other control variables are verified using a number of diagnostic tests. The p-values for these statistics are reported in a separate table.<sup>27</sup>

Table 12 shows the results of the 2SLS model. The results validate a significant and positive impact of the policy initiative on firms’ access to long-term debt ratio and a negative impact on access to short-term debt ratio, with a stronger effect on unconstrained firms. Further, the results show that with an increase in firms’ access to long-term debt, their post-policy investment spending also increased, while post-policy investment declined for firms dependent on short-term debt. Finally, we are unable to find significant differences between different types of firms in the investment model. The remaining control variables maintain

<sup>26</sup> The index is drawn from Rajan and Subramanian (2005) and the original source is the Correlates of War Database.

<sup>27</sup> In addition to the reported statistics, we also employ the Anderson Rubin chi-square test and obtain identical p-values as with the Anderson Rubin F-test.

**Table 10**

Robustness: placebo tests.

Panel 1:	Dependent variable: STD/TD				Dependent variable: LTD/TA			
	(1)				(2)			
Treat*After	−0.467 (−0.26)				−0.989* (−1.67)			
N	15,387				16,492			
R <sup>2</sup>	0.097				0.096			
Panel 2:	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treat*After	−3.363 (−1.26)	7.460* (1.74)	−1.973 (−0.84)	5.080 (1.19)	−0.399 (−0.32)	−2.507*** (−2.69)	−1.007 (−0.82)	−1.446 (−1.56)
N	4809	8999	4925	8883	4982	9814	4952	9844
R <sup>2</sup>	0.110	0.102	0.142	0.095	0.087	0.142	0.121	0.128
Test of equality								
p-Value: Treat*After	0.032	0.149			0.180	0.764		
Dependent variable: INV								
Panel 3:	(1)				(2)			
Treat*After*Lev	0.493 (1.53)				−0.531 (−0.67)			
N	13,145				14,049			
R <sup>2</sup>	0.070				0.066			
Panel 4:	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treat*After*Lev	0.678 (1.28)	0.841 (1.42)	0.841 (1.54)	0.268 (0.46)	−2.438* (−1.67)	0.417 (0.27)	−1.567 (−1.31)	2.641 (1.25)
N	4527	7166	4641	7052	4692	7800	4668	7824
R <sup>2</sup>	0.109	0.058	0.126	0.045	0.103	0.056	0.126	0.047
Test of equality								
p-Value: Treat*After*Lev	0.841	0.478			0.174	0.084		

Notes: All specifications are estimated using the difference-in-differences estimator. The table presents results of placebo tests. In column 1 of Panel 1 the dependent variable is the ratio of short-term debt to total debt (STD/TD), while in column 2 of Panel 1 the dependent variable is the ratio of long-term debt to total assets (LTD/TA). In columns 1–4 of Panel 2 the dependent variable is the ratio of short-term debt to total debt (STD/TD), while in columns 5–8 of Panel 2 the dependent variable is the ratio of long-term debt to total assets (LTD/TA). In Panels 3 and 4 the dependent variable is firm-level investment spending measured as the ratio of capital expenditures to total assets (INV). All regressions include firm fixed effects. The specifications further include country dummies and time dummies interacted with industry dummies. The figures reported in parentheses are robust t-statistics. The standard errors are clustered over firms. The remaining specifications, which are not reported for brevity, are identical to those in Tables 3 to 6.

\*\*\* Statistical significance is denoted at 1%.

\*\* Statistical significance is denoted at 5%.

\* Statistical significance is denoted at 10%.

their significance and expected signs. Overall, the diagnostic tests presented in Table 13 do not indicate any problems regarding the choice and relevance of our instruments. In sum, we conclude that our findings are robust to endogenous regressors.

### 6.7. Additional tests

We conduct four additional tests for the results established in the main section. The results of these additional robustness tests are summarised below but are not reported due to space constraints. They are available upon request.

First, in order to confirm that our main results are not driven by Korea, which has the largest bond market in our treated group, we reproduce the models after removing Korea from our sample. All significant point estimates remain within the same confidence interval and retain their level of significance. Thus, we conclude that the inclusion of Korea in our sample does not bias our results in any way.

Second, we consider alternative classification schemes for profitability and riskiness. In our main empirical results, we classified our firms into constrained and unconstrained groups using the 50th percentile of the distribution in the pre-policy period. In order to confirm that our results are not driven by the way we divide our sample, we split our firms into constrained and unconstrained groups using the 75th percentile as a cut-off point in the pre-policy period (see Tsoukas, 2011). The coefficients obtained are both qualitatively and quantitatively very similar to our main results. Hence, we conclude that our results are robust to alternative cut-off points.

**Table 11**

Robustness: matching approach.

Panel 1:	Dependent variable: STD/TD				Dependent variable: LTD/TA			
	(1)				(2)			
Treat*After	−3.083*** (−2.85)				1.382*** (4.00)			
N	20,797				23,440			
Panel 2:	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treat*After	−2.335 (−1.41)	−5.225*** (−3.36)	−1.489 (−1.00)	−4.991*** (−2.90)	0.853 (1.50)	2.086*** (4.90)	−0.110 (−0.17)	2.283*** (5.86)
N	8676	12,121	8699	12,098	9562	13,878	9114	14,326
Test of equality	0.109	0.125	0.142	0.105	0.115	0.164	0.134	0.143
p-Value: Treat*After	0.204		0.124		0.080		0.004	
Dependent variable: INV								
Panel 3:	(1)				(2)			
	Treat*After*Lev				Treat*After*Lev			
N	−0.937*** (−2.74)				4.896*** (4.18)			
N	19,344				21,312			
Panel 4:	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treat*After*Lev	−0.573 (−1.09)	−1.344*** (−2.73)	−0.502 (−0.90)	−1.011** (−2.17)	2.116 (1.20)	7.137*** (4.16)	2.052 (1.38)	6.310*** (2.82)
N	8250	11,094	8209	11,135	8861	12,451	8405	12,907
Test of equality	0.058	0.084	0.061	0.081	0.064	0.081	0.063	0.076
p-Value: Treat*After*Lev	0.285		0.484		0.041		0.114	

Notes: All specifications are estimated using the difference-in-differences matching estimator. Treated firms belong to the counties that participated in the policy initiatives. Control firms are matched firms from Taiwan using the Leuven and Sianesi's (2003) propensity score matching technique. The matching covariates are size, liquidity, leverage, expansion rate, operating cycle, and cash flow (pre-treatment values). In column 1 of Panel 1 the dependent variable is the ratio of short-term debt to total debt (STD/TD), while in column 2 of Panel 1 the dependent variable is the ratio of long-term debt to total assets (LTD/TA). In columns 1–4 of Panel 2 the dependent variable is the ratio of short-term debt to total debt (STD/TD), while in columns 5–8 of Panel 2 the dependent variable is the ratio of long-term debt to total assets (LTD/TA). In Panels 3 and 4 the dependent variable is firm-level investment spending measured as the ratio of capital expenditures to total assets (INV). All regressions include firm fixed effects. The specifications further include country dummies and time dummies interacted with industry dummies. The figures reported in parentheses are robust t-statistics. The standard errors are clustered over firms. The remaining specifications, which are not reported for brevity, are identical to those in Tables 3 to 6.

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Third, we corroborate the accurate identification of the policy initiative on the treated group by employing an index as a measure of the treatment. In our main models we use a dummy variable for the treatment period, but in this section we use the Markit iBoxx ABF index as the measure of treatment. This ABF index is the first set of independent Asian local currency bond indices introduced as part of the ABF-2 policy. These indices are used as benchmarks by asset managers, as they reflect the performance of the local currency denominated sovereign and quasi sovereign debt from eight Asian countries/territories. The index gives broad coverage of the sovereign and sub-sovereign bond universe of the treated countries while upholding minimum standards of investability and liquidity.<sup>28</sup> The point estimates are in line with our main findings. Thus, we can conclude that employing an index as a measure of treatment does not alter our results.

Finally, we entertain additional control variables that have been found to be important in explaining firms' financing choices. We start by including a dummy for the global financial crisis to control for potential crisis-related effects on access to firms' credit. The dummy takes the value of one for the period 2007–2010, and zero otherwise. In addition, we control for stock market capitalisation and the currency of bond denomination. Importantly, the main results remain unchanged in terms of sign and statistical significance. As for the control variables, we find that the crisis dummy attains a positive coefficient for the long-term debt model, while it is quantitatively unimportant for the short-term debt model. This finding supports the notion that

<sup>28</sup> The index history statistics starts on 31/12/2000 and cover a variety of markets, including small (Hong Kong, Singapore) and large (Korea, China) bond markets. Using simple weights will skew the index in favour of larger markets and reduce the weight of smaller markets. Hence, the baseline weight of these indices is adjusted by the local bond market size, sovereign local debt rating and GEMLOC investability indicator.



**Table 12**

Robustness: IV regressions.

Panel 1:		Dependent variable: STD/TD				Dependent variable: LTD/TA			
		(1)				(2)			
Treat*After	−3.422*** (−3.68)					1.191*** (4.01)			
N	32,555					35,776			
R <sup>2</sup>	0.071					0.090			
Panel 2:	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Treat*After	−0.494 (−0.37)	−6.595*** (−4.65)	−0.664 (−0.53)	−6.060*** (−4.04)	0.498 (1.00)	1.761*** (4.59)	−0.490 (−0.91)	2.215*** (6.64)	
N	12,253	19,428	12,601	19,130	13,069	21,829	12,837	22,124	
R <sup>2</sup>	0.078	0.065	0.110	0.062	0.016	0.124	0.067	0.086	
Test of equality									
p-Value: Treat*After	0.002	0.006				0.047	0.001		
Dependent variable: INV									
Panel 3:	(1)	(2)							
Treat*After*Lev	−6.116*** (−5.32)	11.232*** (5.16)							
N	21,228	26,362							
R <sup>2</sup>	−0.253	−0.191							
Panel 4:	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Treat*After*Lev	−6.907*** (−3.95)	−6.447*** (−4.08)	−4.318** (−2.22)	−7.069*** (−3.86)	12.331** (2.56)	14.562*** (3.20)	7.410 (1.25)	14.831** (2.13)	
N	7655	11,487	7848	12,132	9707	14,348	8846	15,651	
R <sup>2</sup>	−0.021	0.004	0.013	−1.041	0.023	0.016	0.000	−1.124	
Test of equality									
p-Value: Treat*After*Lev	0.845	0.308				0.734	0.412		

Notes: All specifications are estimated using the Instrumental Variables (2SLS) estimator. All firm-level variables are instrumented using their lagged levels in  $t-2$ . The policy effect (Treat\*After) is instrumented using the “Entente Alliances” index. In column 1 of Panel 1 the dependent variable is the ratio of short-term debt to total debt (STD/TD), while in column 2 of Panel 1 the dependent variable is the ratio of long-term debt to total assets (LTD/TA). In columns 1–4 of Panel 2 the dependent variable is the ratio of short-term debt to total debt (STD/TD), while in columns 5–8 of Panel 2 the dependent variable is the ratio of long-term debt to total assets (LTD/TA). In Panels 3 and 4 the dependent variable is firm-level investment spending measured as the ratio of capital expenditures to total assets (INV). All regressions include firm fixed effects. The specifications further include country dummies and time dummies interacted with industry dummies. The figures reported in parentheses are robust t-statistics. The standard errors are clustered over firms. The remaining specifications, which are not reported for brevity, are identical to those in Tables 3 to 6.

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as yields on corporate bonds declined in safe havens during this period, a new search for yield saw a resurgence in demand for corporate bonds and greater issuance in emerging markets. Finally, we are unable to find any significant effects for stock market capitalisation and the currency of bond denomination.

## 7. Conclusion

We use a panel of 7286 firms from eight Asian economies to study the interactions between changes in the financial composition of firms and policy initiatives. When estimating models of finance composition using a difference-in-differences estimator, we find that after the introduction of the ABF2, firms experienced a decline in the proportion of short-term debt to total debt, all other things being equal. We also documented an increase in the proportion of long-term to total assets in the post ABF2 period. These findings suggest that the policy enabled firms to gain access to longer maturity debt. Yet, when we allow for firm heterogeneity, by splitting our firms based on their profitability and riskiness, we show that more profitable and less risky firms benefitted significantly more than their counterparts.

In addition, we estimate an investment equation for the post-ABF2 period, distinguishing between different maturities of debt. We find that the initiative helped firms finance their investment spending by increasing their access to long-term debt. Once again, firm-level heterogeneity appears to be of great importance, since the effect is more potent for more profitable and less risky firms.

**Table 13**  
Robustness: IV diagnostic tests.

Panel 1:	Dependent variable: STD/TD				Dependent variable: LTD/TA			
	(1)				(2)			
Kleibergen-Paap	0.000				0.000			
Anderson-Rubin	0.000				0.000			
Stock-Wright	0.000				0.000			
Hansen J	0.502				0.173			
Panel 2:	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Kleibergen-Paap	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Anderson-Rubin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Stock-Wright	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hansen J	0.837	0.430	0.319	0.377	0.498	0.606	0.888	0.640
Dependent variable: INV								
Panel 3:	(1)				(2)			
Kleibergen-Paap	0.050				0.021			
Anderson-Rubin	0.000				0.000			
Stock-Wright	0.000				0.000			
Hansen J	0.405				0.586			
Panel 4:	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1	PROF = 0	PROF = 1	RISKY = 0	RISKY = 1
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Kleibergen-Paap	0.000	0.000	0.000	0.035	0.000	0.000	0.000	0.063
Anderson-Rubin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Stock-Wright	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hansen J	0.543	0.106	0.577	0.837	0.361	0.227	0.445	0.887

Notes: The table presents diagnostic tests for the IV regression models reported in Table 12. The Kleibergen-Paap is a test of under-identification distributed as chi-square under the null of under-identification. The Anderson Rubin and Stock-Wright LM S statistic are weak-instrument-robust inference tests, which are distributed as F-test and chi-square respectively, under the null that coefficients of the endogenous regressors in the structural equation are jointly equal to zero, and the over-identifying restrictions are valid. The Hansen J statistic is a test of the over-identifying restrictions, distributed as chi-square under the null of instrument validity.

Our results, which are robust to different estimation methods and many specifications and controls, have important implications for national governments that shape the policies that alter the attractiveness of the different markets. We argue that the ABF2 initiative, which aimed to promote the growth of the Asian bond market, was successful in contributing to its goals. Therefore, the initiative should remain an important policy goal for Asia's governments in order to positively effect the region's economic performance. In addition, Latin American economies should carefully consider similar projects, as they are seeking to develop their local markets.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.jcorpfin.2016.09.008>.

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